

WHAT IS CLAIMED IS:

1. A thermoplastically processable polyurethane elastomer (TPU) having a tensile strength of > 35 MPa (measured in accordance with EN ISO 527-5), with shrinkages of < 3% and with self-extinguishing properties which comprise the reaction product of :

(1) a prepolymer containing NCO groups which comprises the reaction product of

10 A) at least one organic diisocyanate, and

B) at least one polyol having on average at least 1.8 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number-average molecular weight \bar{M}_n of 450 to 10,000;

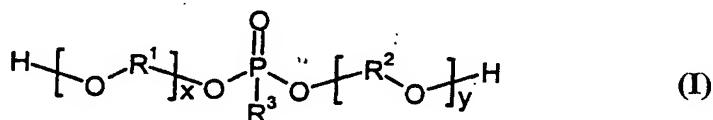
with

15 C) at least one low molecular weight polyol or polyamine having on average at least 1.8 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number-average molecular weight \bar{M}_n of 60 to 400 as a chain lengthener;

and

20 D) from 1 to 15 wt.%, based on the total weight of the TPU, of at least one organic phosphorus-containing compound selected from the group consisting of phosphonates and phosphine oxides having on average at least 1.5 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number-average molecular weight \bar{M}_n of 60 to 10,000 corresponding to

25 the following structural formula:



wherein:

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R^1 and R^2 : may be the same or different, and each independently represents a branched or unbranched alkylene radical having 1 to 24 carbon atoms, a substituted or unsubstituted arylene radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkylene radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkarylene radical having 6 to 30 carbon atoms;

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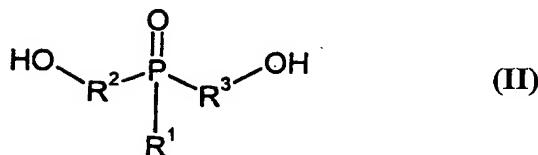
R^3 : represents a hydrogen atom, a branched or unbranched alkyl radical having 1 to 24 carbon atoms, a substituted or unsubstituted aryl radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkyl radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkaryl radical having 6 to 30 carbon atoms;

15

and

x and y each independently represents a number from 1 to 50;

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wherein:

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R^1 : represents a hydrogen atom, a branched or unbranched alkyl radical having 1 to 24 carbon atoms, a substituted or unsubstituted aryl radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkyl radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkaryl radical having 6 to 30 carbon atoms;

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R^2 and R^3 : may be the same or different, and each independently represents a branched or unbranched alkylene radical having 1 to 24 carbon atoms, a substituted or unsubstituted arylene radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkylene radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkarylene radical having 6 to 30 carbon atoms

and, optionally, in the presence of:

10 E) one or more catalysts;

F) from 0 to 70 wt.%, based on the total weight of the TPU, of at least one further flameproofing agent which contains no Zerewitinoff-active hydrogen atoms and has a number-average molecular weight \bar{M}_n of 60 to 10,000;

15 and/or

G) 0 to 20 wt.%, based on the total weight of the TPU, of further auxiliary substances and additives;

wherein the Isocyanate Index ranges from 85 to 120.

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2. A process for the preparation of thermoplastically processable polyurethane elastomers (TPU) with tensile strengths of > 35 MPa (measured in accordance with EN ISO 527-3), with shrinkages of < 3% and with self-extinguishing properties, comprising

(I) preparing a) a prepolymer containing NCO groups by reacting

25 A) at least one organic diisocyanate,
with

B) at least one polyol having on average at least 1.8 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number-average molecular weight \bar{M}_n of 450 to 10,000;

30 (II) reacting a) said prepolymer with:

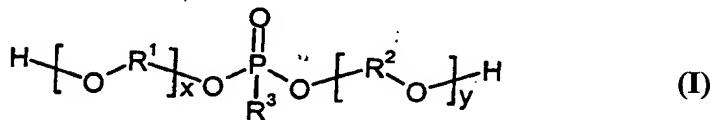
C) at least one low molecular weight polyol or polyamine having on average at least 1.8 and not more than 3.0 Zerewitinoff-active

hydrogen atoms and a number-average molecular weight \bar{M}_n of 60 to 400 as a chain lengthener;

and

D) from 1 to 15 wt.%, based on the total weight of the TPU, of at least one organic phosphorus-containing compound selected from the group consisting of phosphonates and phosphine oxides having on average at least 1.5 and not more than 3.0 Zerewitinoff-active hydrogen atoms and a number-average molecular weight \bar{M}_n of 60 to 10,000 corresponding to the following structural formula:

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wherein:

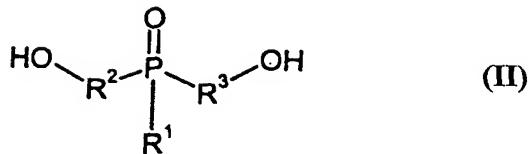
R¹ and R²: may be the same or different, and each independently represents a branched or unbranched alkylene radical having 1 to 24 carbon atoms, a substituted or unsubstituted arylene radical having 6 to 20 carbon atoms, a substituted or unsubstituted

15 alkylene radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkylene radical having 6 to 30 carbon atoms;

20 R³: represents a hydrogen atom, a branched or unbranched alkyl radical having 1 to 24 carbon atoms, a substituted or unsubstituted aryl radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkyl radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkaryl radical having 6 to 30 carbon atoms;

25 and

x and y each independently represents a number from 1 to 50;



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wherein:

10 R^1 : represents a hydrogen atom, a branched or unbranched alkyl radical having 1 to 24 carbon atoms, a substituted or unsubstituted aryl radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkyl radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkaryl radical having 6 to 30 carbon atoms;

15 R^2 and R^3 : may be the same or different, and each independently represents a branched or unbranched alkylene radical having 1 to 24 carbon atoms, a substituted or unsubstituted arylene radical having 6 to 20 carbon atoms, a substituted or unsubstituted aralkylene radical having 6 to 30 carbon atoms, or a substituted or unsubstituted alkarylene radical having 6 to 30 carbon atoms

20 with steps (I) and (II) optionally being carried out in the presence of

E) one or more catalysts,
 and optionally with the addition of:
 25 F) 0 to 70 wt.%, based on the total weight of the TPU, of at least one further flameproofing agent which contains no Zerewitinoff-active hydrogen atoms and has a number-average molecular weight \bar{M}_n of 60 to 10,000,
 and/or

G) 0 to 20 wt.%, based on the total amount of TPU, of further auxiliary substances and additives,

wherein the Isocyanate Index ranges from 85 to 120.

5 3. The process of Claim 2, wherein the reactive components C) and D) are added simultaneously to the prepolymer.

4. The process of Claim 2, wherein component C) is added to the prepolymer first, and then component D) is added.

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5. The process of Claim 2, wherein component D) is added to the prepolymer first, and then component C) is added.

15 6. The process of Claim 2, wherein A) said organic diisocyanate comprises an aromatic diisocyanate.

7. The process of Claim 2, wherein B) said polyol comprises a polyether polyol.

20 8. The process of Claim 2, wherein C) said low molecular weight polyol comprises ethylene glycol, butanediol, hexanediol, 1,4-di-(beta-hydroxyethyl)-hydroquinone, or 1,4-di-(betahydroxyethyl)bisphenol A.

25 9. The process of Claim 2, wherein component D) has a functionality of, on average, 2.